Bleeding complications according to classification used: Is unified classification of bleeding complications

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Abstract

To compare the number of severe periprocedural bleeding complications from the total number of bleeding complications associated with diagnostic selective coronary an- giography or percutaneous coronary intervention (PCI) when using different classifications (TIMI, GUSTO, PLATO, BARC) and to relate these classifications to real hemodynamic status of evaluated patients.

Key words: ischemic heart disease, bleeding complications, classification of bleeding

Introduction.

The treatment of patients with acute coronary syndrome (ACS), as well as those with stable form of ischemic heart disease (IHD) has developed rapidly in the last several decades. Invasive proce- dures in cardiology, e.g. selective coronary angiog- raphy (CAG) as a diagnostic method and percutane- ous coronary intervention (PCI) as a therapeutic method have become part of a routine practice. With continuous improvement in technique of CAG and PCI, with new materials used and mainly with development of new types of more effective antiplatelet and anticoagulant drugs, the number of death rates according to ischemic events and periprocedural ischemic complications including ischemic stroke and heart failure has decreased to minimum and almost reached boundary for further reduction [1, 2]. On the other hand, older people and patients with wider range of comorbidities undergo invasive procedure as a therapeutic and very often it is the only diagnostic method for all forms of IHD.

Furthermore, in current era of evidence based medicine, it is then very important to compare acquired data from all those provided clinical tri- als with each other. In association with bleeding complications, the comparability is now affected with wide number of different classifications that have been used for evaluation of those complica- tions in last decades [13]. Each classification has been tailored according to study design meaning different outcomes are evaluated for in-

hospital mortality of patients with ACS requiring rescue PCI than in classification for long term follow up. This variability in bleeding classifications used across clinical trials led us to compare the most often used classifications. The aim was to find out how different outcomes may develop when vari- ous classifications are used in one patient group.

Developed bleeding

We analyzed periprocedural bleeding com- plications in a group of patients who developed bleeding in association with CAG or PCI. Ethics Committees of participating institutions approved the study protocol. Patients were included in the study after signing an informed consent for par- ticipation. No exclusion criteria were applied for study participation.

Basic demographic data, medical history, car- diovascular risk factors, major comorbidities, clini- cal status and laboratory findings were recorded. Medical history was obtained from patients' medi- cal documentation or personal interview. Clinical evaluation was performed during admission to the hospital and then relevant changes of clinical status were noted during hospitalization. Blood count was measured in all patients with a special emphasis on level of hemoglobin and hematocrit. The kidney function was monitored using creatinine clearance received by Cockroft-Gault formula. Also factors related directly to invasive procedure including number of affected vessels, administered anti- platelet or anticoagulant drugs and type of arterial access (femoral or radial) were observed.

With all these collected data mentioned above we were able to process number of bleeding com- plications according to different criteria. We evalu- ated number of these complications according to

i) Hemodynamic compromise of the patients and subsequent need of treatment ii) localization of the bleeding. For evaluation hemodynamic compromise and subsequent treatment we established 7 con- secutive groups according to severity of bleeding: bleeding with no need of treatment, 2) with local therapy needed, 3) with blood transfusion administration, 4) with surgical revision, 5) bleed- ing leading to hemodynamic instability (defined as decrease in blood pressure affecting the function of any organ requiring intravenous solution or any supportive drug administration which do not meet criteria for hemorrhagic shock), 6) bleeding leading to hemorrhagic shock (defined as bleeding meet- ing at least 3 following criteria: with systolic blood pressure < 90 mm Hg, tachycardia > 120/min, anuria, tachypnea > 30/min, quantitative or qualitative alteration of consciousness), 7) fatal bleeding. Then we applied on this group of patients 4 different classifications of bleeding complications that are standardly used for evaluating data from large randomized cardiovascular clinical trials — Thrombolysis in Myocardial Infarction (TIMI), Global Use of Strategies to Open Occluded Arter- ies (GUSTO), Platelet Inhibition and Patient Out- comes (PLATO) and Bleeding Academic Research Consortium (BARC) [12, 14–16].

Finally, we made a correlation between the seriousness of bleeding according to hemodynamic compromise with each bleeding classification sepa- rately. Each of the 4 representative classifications provides an ordinal scale. The scales given by classifications TIMI, GUSTO and PLATO distinguish 3 degrees of bleeding severity, while BARC pro- vides a more complex scale. The hemodynamic status is also described by an ordinal scale which distinguishes 7 levels defined above. As the rela- tions between each of the 4 classifications and patients' real hemodynamic status were to be compared, the most suitable statistic to use was Kendal's tau-c. Kendal's tau-c coefficient ranges from –1 to 1 meaning strong negative and strong positive association, respectively. The values close to –1 signify the higher degree of particular classification the worse hemodynamic status, therefore the strongest correlation.

Results

The study population consists of 106 patients who developed bleeding complication in association with invasive procedure performed for any form of IHD from 5 cardio centers from Czech Republic (Prague, Pilsen, Olomouc, Zlin, Ostrava) between 2006 and 2012. Only patients with all data required for analysis were included. There were enrolled patients with ACS (STEMI, NSTEMI, unstable angina pectoris).

Discussion

Our results show significant differences in number of severe bleeding complications that may lead to huge heterogeneity in presentation of out- comes when different classifications are used and that classifications do not always reflect the real hemodynamic compromise of the patient and so it could underestimate the real risk. The differences are emphasized mainly for those bleeding compli- cations that are classified in the middle part of the scale (meaning not life-threatening or minimal).

The bleeding may prolong their hospitalization, which in turn may bring many other complications leading to increased morbidity and mortality [18]. Also, administration of blood transfusion, which occurred in 14.2% of patients, is associated with higher rate of morbidity and mortality and it is not recommended as routinely as before [19].

From wide range of the bleeding classifications that are normally used in large randomized clinical trials we applied 4 of them in our group of patients. Using 4 different classifications (TIMI, GUSTO, PLATO and BARC) we observed per- centage of severe bleeding complications, as for better comparability we merged categories of severe bleeding in PLATO and BARC classifica- tion into one group. The results after application of these 4 different classifications scales on one group of patients show significant differences be- tween incidences of severe periprocedural bleed- ing complications depending on classification used. The rates of severe bleeding complication were significantly lower when the simplest clas- sifications, TIMI and GUSTO, were applied (9.4% and 15.1%, respectively). Using more complex classification that is in our study represented by classification from PLATO trial, the rate of severe bleeding complications increases almost 4-times (39.6%). Similar percentage of severe complication which was reached with PLATO classification was also achieved with BARC classification (35.9%). Except for finding that outcomes may be strongly influenced with selected classification, these data may indicate that using simpler and limited classi- fication (using pure laboratory or pure clinical data).

Conclusions

All these findings demonstrate how different classification may strongly affect outcomes from clinical trials and then subsequently strongly influence the recommendations for evidence based treatment of patients with IHD. One unified classification that could be used generally in practice and across clinical trials in cardiology seems to be necessary. The classification must be constructed to capture all bleeding events that are important and meaningful as for patients as for clinical outcomes while remaining simple, broadly applicable and easy for use. Recently introduced BARC classification seems to meet all those criteria for applicability in routine clinical and research practice. In that case, all researchers, experts and clinicians should be aware of this new classification and report bleeding events according to this

BARC definition so it could be proven in practice and the data can be comparable in the future.

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